University of Alberta

Effects of question type on the language of individuals with Alzheimer disease

by

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A thesis submitted to the Faculty of Graduate Studies and Research
in partial fulfillment of the requirements for the degree of

Master of Science

in

Speech-Language Pathology

Department of Speech Pathology and Audiology

Edmonton, Alberta
Fall 2007

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395, rue Wellington
Ottawa ON K1A 0N4
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Your file Votre référence
ISBN: 978-0-494-33327-3
Our file Notre référence
ISBN: 978-0-494-33327-3

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Abstract

The purpose of this study was to investigate the effects of asking open-ended episodic memory questions versus open-ended semantic memory questions on the discourse of individuals with Alzheimer Disease (AD). Four females diagnosed with probable AD participated in the study. A within subjects experimental design was employed to assess the effects of the different question types on the communicative abilities of the persons with AD. Transcripts were analyzed using specific measures of language and discourse. Participants in this study produced more meaningful and relevant statements, as measured by ratios of on-topic utterances, when responding to the semantic memory questions. Certain types of utterances were produced only in response to the episodic memory questions. Clinical implications, limitations and directions for future research are discussed.

Acknowledgements

I would like to formally thank my supervisor Tammy Hopper and the members of my graduate committee Lili Liu and Joanne Volden for their invaluable advice and support. I would also like to thank the participants and their families and to acknowledge Arlene Huhn and Jackie Gendre at the Alzheimer Society of Alberta and Northwest Territories for assistance with participant recruitment.

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List of Abbreviations

AD = Alzheimer disease

GDS = Global Deterioration Scale

MMSE = Mini-Mental State Examination

ABCD = Arizona Battery for Communication Disorders of Dementia

wpm = words per minute

dB SPL = decibels sound pressure level

No. = Number

Introduction

Improving communication between people with Alzheimer disease (AD) and their caregivers is a primary role for speech-language pathologists. Communication is the process of exchanging information, ideas and feelings. Effective communication requires intact memory, attention, executive functions and other cognitive abilities that support the processing of both linguistic and nonlinguistic stimuli (Arkin & Mahendra, 2001; Hartley, 1995). For people with AD, the ability to make social and basic needs known slowly erodes because of significant impairments in these cognitive systems. When this happens, communication partners may not know how to facilitate meaningful conversations with individuals who have AD, which can lead to interpersonal problems, social isolation, depression and caregiver burden (Orange & Colton-Hudson, 1998; Small, Geldert, Gutman & Clark Scott, 1998; Williamson & Shultz, 1993).

Theories exist about how clinicians can support families and caregivers in developing facilitative communication strategies. Still, the research literature is mixed with regard to how caregivers should interact with individuals who have AD to capitalize on preserved cognitive functions while reducing cognitive processing demands on impaired ones. The purpose of this study is to evaluate the effects of specific question types on the discourse of individuals with mild to moderate dementia of the Alzheimer type.

Literature Review

Alzheimer Disease: Demographics and Neuropathology

Alzheimer disease (AD) is a chronic, progressive neurodegenerative condition that causes approximately 50% of all cases of dementia (Bayles & Tomoeda, 1995). The disease process is characterized by initial prominent deficits in memory in addition to impairments in other cognitive functions (Zillmer & Spiers, 2001). Affected individuals eventually have difficulty with activities of daily living and typically experience changes in personality, behavior and judgment (Zillmer & Spiers, 2001).

AD is a growing health concern for older Canadians. One in 13 Canadians over age 65 is affected by AD and related dementias with the number rising to 1 in 3 for those over age 85 (Canadian Study on Health and Aging Working Group, 1994). By 2031, researchers project that 750,000 Canadians will have AD and related dementias (Canadian Study of Health & Aging Working Group, 1994). More than half will be institutionalized. The well-being of persons with AD is of interest to many health professionals, including speech-language pathologists, as cognitive deficits underlie the communication difficulties common in individuals with the disease.

The cause of AD remains unknown. However, changes at the cellular level in neurons include degeneration of specific nerve cells, changes in neurotransmitter levels and the abnormal deposition of neurofibrillary tangles and neuritic plaques (McKhann et al., 1984). Multiple neurotransmitter systems are altered by the disease process, including cortical somatostatin, and cortical, hippocampal, and basilar forebrain cholinergic systems (Nolte, 1999). The observed neurofibrillary tangles consist of tau proteins accumulating in the cytoplasm (Braak & Braak, 1995; Zillmer & Spiers, 2001).

The neuritic plaques contain the amino acid peptide protein core beta-amyloid, and are often referred to as amyloid or senile plaques (Zillmer & Spiers, 2001). Initially, neurofibrillary tangles develop in the temporal lobe, hippocampus and the entorhinal region, which is the major afferent to the hippocampus (Braak & Braak, 1995). Eventually, the neuropathology spreads to numerous frontal, temporal, and temporal-parietal areas (Zillmer & Spiers, 2001). Because these abnormal processes also appear in the brains of typically aging adults, who have no evidence of dementia or other degenerative diseases, researchers have determined that it is the pattern and quantity of these markers that defines and differentiates AD from normal or typical aging (Braak & Braak, 1995; Khatchaturian, 1985 as cited in Almkvist, 2000). Finally, a diagnosis of AD is only made upon examination of neural tissue. Therefore, according the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; American Psychiatric Association, 2000), when individuals are alive, diagnosis is labeled as possible or probable, depending on symptoms.

The effects of the neuronal changes are manifest in gross atrophy of neural tissue. This atrophy is apparent on computerized tomography (CT) and magnetic resonance imaging (MRI), two procedures used in the assessment of persons with dementia. Atrophy is most prominent in the mesial cortices (Jernigan, Salmon, Butters & Hesselink, 1991) and the hippocampus (Nolte, 2002) consistent with the distribution of the neuropathology (Zillmer & Spiers, 2001).

Although a linear relationship between cerebral atrophy and the clinical features reported in persons with AD does not exist (Nussbaum, 1997), the cognitive deficits of AD are consistent with the areas of the brain most affected by the disease. The frontal

and temporal lobes are strongly associated with higher level cognitive abilities including executive functions, and complex aspects of attention and memory (Nolte, 1999; Zillmer & Spiers, 2001). The primary motor and sensory regions of the brain, located in the frontal and parietal lobes of the brain respectively (Nolte, 1999), appear to remain relatively unaffected by the neuropathology until the very late stages (Almkvist, 2000). This corresponds to relatively spared motor, tactile and proprioceptive abilities (Nolte, 1999) observed in individuals with mild and moderate AD.

The Global Deterioration Scale (GDS; Reisberg, Ferris, de Leon, & Crook, 1982) is an observation scale used exclusively for staging dementia severity in persons with AD. The GDS defines seven clinical stages of cognitive decline associated with AD, ranging from stage 1, which reflects normal function, to stage 7, which represents very severe dementia (see Table 1). Designation of clinical stage is based on cognitive and behavioral criteria related to memory function, ambulatory status, continence, and ability to perform activities of daily living. Stages 2 and 3 correspond to early stages of cognitive decline. Stages 4 and 5 correspond to the middle stages and stages 6 and 7 to the late stages of cognitive decline. The GDS correlates significantly with anatomic and metabolic brain changes observed using computerized tomographic scans and positron emission tomography respectively (Reisberg et al., 1982).

Table 1. Global Deterioration Scale.

Stage	Characteristics
1	No cognitive decline
2	Very mild cognitive decline
3	Mild cognitive decline
4	Moderate cognitive decline
5	Moderately severe cognitive decline
6	Severe cognitive decline
7	Very severe cognitive decline

Cognitive Changes in Alzheimer Disease

The clinical presentation of individuals who have AD can vary, but profound impairments in memory are the hallmark characteristics of AD (Bayles & Tomoeda, 1995). Memory is of many types, with each type subserved by different neuroanatomical substrates (Nolte, 2002). In the following section, memory will be discussed and deficits and retained abilities in individuals with AD will be described.

Memory

Memory is composed of several systems and subsystems including working memory and long-term declarative and nondeclarative memory systems (Schacter & Tulving, 1994). According to Baddeley (1999) each system is involved in encoding, storing and retrieving information. Information from the external environment is attended to and processed within working memory. Facts and events that we are consciously aware of and able to verbalize are processed within declarative memory (Dawson, 1998; Zillmer & Spiers, 2001). Examples of declarative memory may include knowing that the Leaning Tower of Pisa is in Italy or remembering the name of a newly

released movie. Skills, abilities, and other types of learned knowledge of rules and procedures are processed within nondeclarative memory systems (Baddeley, 1999; Dawson, 1998; Zillmer & Spiers, 2001). Examples of nondeclarative memory include remembering how to ride a bike and playing cribbage.

Working memory refers to an interacting set of systems that temporarily store essential pieces of information until they are no longer relevant to the task at hand (Baddeley, 1999). Working memory can be thought of as a tripartite system with short term storage components for verbal and visual information and a more fluid component called the central executive which is responsible for simultaneous storage and information processing (Baddeley, 1999). Verbal working memory consists of the phonological loop, also referred to as the articulatory loop, which is responsible for short-term storage and rehearsal of auditory stimuli (Baddeley, 1999). Visual working memory is composed of the visuospatial sketchpad and is responsible for the exhibition and manipulation of visual imagery and spatial information (Baddeley, 1999). Finally, the central executive is conceptualized as a finite capacity attentional system that provides direction to the phonological loop and visuospatial sketch pad (Baddeley, 1999). The central executive selects and executes strategies for directing attention and manipulating information from different sources (Giovanello & Verfaellie, 2001). A revised multi-component model of working memory proposes a multi-modal storage system in addition to the two uni-modal storage systems (phonological loop and visuospatial sketchpad) and directing central executive (Repovs & Baddeley, 2006). Termed the episodic buffer, its role is to integrate and maintain information from various sources including other working memory components as well as long-term memory (Repovs & Baddeley, 2006).

The conscious awareness of the individual is postulated to direct the retrieval of information from specific sources and modalities (Repovs & Baddeley, 2006). According to Nolte (2002), the dorsal and lateral prefrontal cortex regulates working memory functioning.

Declarative memory systems comprise episodic and semantic memory, and are involved in remembering previous experiences or facts (Baddeley, 1999; Nolte, 2002). Episodic memory has been defined as an individual's autobiographical memory, encoded in a temporal/spatial context (Tulving, 1983). These memories are composed of perceptual, conceptual and affective responses to personally relevant experiences (Giovanello & Verfaellie, 2001). The ability to recall information recently seen or heard, such as remembering what happened at work yesterday or what was just said in conversation, is a function of episodic memory. The most reported initial subjective complaint from individuals with AD is difficulty remembering recent events (Hopper & Bayles, 2001). As well, persons with early stage AD consistently perform poorly on tasks designed to test episodic memory, such as verbal recall tasks (Hopper & Bayles, 2001). The frontal lobes are involved in both the encoding and retrieval phases of episodic memory functioning (Baddeley, 1999; Giovanello & Verfaellie, 2001). The hippocampus and its afferent projections to the mamillary bodies, as well as the temporal lobes, have also been proposed to be structures supporting the processing of episodic memories (Giovanello & Verfaellie, 2001). Almkvist (2000) asserts that deficits in episodic memory can be observed during the preclinical phase of AD and mark the beginning of the disease process.

Semantic memory, another type of declarative memory, comprises information and facts about the world that, unlike episodic memory, are not associated with a specific context (Giovanello & Verfaellie, 2001). For example, we know that Canada is a country and that smoking cigarettes can be harmful but likely do not have a specific memory associated with when we first acquired these pieces of information. Our conceptual knowledge about the world is hypothesized to be stored in distributed cortical association networks (McClelland, McNaughton & Reilly, 1995). The distribution of this information may make it less vulnerable to the early effects of AD neuropathology. When cortical degeneration becomes widespread in the later stages, semantic memory is significantly affected and concepts may become completely inaccessible to a person with AD (Baddeley, 1999).

The progressive nature of AD leads to clinical descriptions that are laden with deficits and decline. However, a growing body of literature supports the notion that some areas of relative strength in persons with AD remain. As mentioned, semantic memory may be relatively preserved until later stages of decline (Nebes, 1994; Nebes et al., 1984; 1986). In fact, individuals with mild to moderate AD may be able to recognize that which they cannot actively recall. For example, they may be able to choose a correct response when provided with a choice (e.g., Is an orange a fruit or meat?) although they may not correctly answer an open-ended question which requires free recall of information (e.g. What kind of food is an orange?).

Nondeclarative memory systems also may be relatively preserved. These systems include memory for habits and some cognitive and motor procedures (Heindel, Salmon, Shults, Walicke & Butters, 1989; Hopper, Bayles & Kim, 2001). For example, persons

with AD may be able to engage in activities such as making a sandwich, folding clothes, and sweeping long after they cannot remember events and facts about their daily lives.

Executive Functions and Attention

For over a century frontal lobe damage has been associated with impairments in executive functioning and attention (Perry & Hodges, 1999). Executive functioning can be defined as cortical activity associated with higher-order cognitive abilities invoked during the planning, initiation, and regulation of behavior (Perry & Hodges, 1999). Researchers report that impairments in executive functions are already evident in the early stages of AD (Bayles & Tomoeda, 1995; Perry & Hodges, 1999). However, in comparison with memory, little research has been conducted on other cognitive abilities impaired in AD. In a literature review searching the PsychInfo data base files using the key words 'executive function' and 'Alzheimer('s) disease' or 'dementia of Alzheimer('s) type', 115 entries were found. Of these articles, only 15 included studies in which the objective was to carefully examine and describe the executive functioning in persons with AD. Therefore, beyond clinical reports, few data exist on the decline of executive functions in AD. Moreover, researchers and clinicians do not all subscribe to the same neuropsychological method for assessing executive dysfunction in dementia, thus the multitude of approaches taken by investigators complicates interpretation of the available research.

The literature on attention is somewhat more developed. Attention refers to the ability to concentrate on internal or environmental stimuli (Hopper et al., 2001). Evidence from neuroscience has led researchers to posit that attention, like memory, is characterized by multiple subtypes supported by separate anatomical structures (Perry &

Hodges, 1999). These attentional subsystems are commonly referred to as selective attention, divided attention, and sustained attention (Almkvist, 2000). Selective attention refers to the ability to ignore irrelevant stimuli and may be supported by posterior parietal, anterior midline and basal ganglia systems (Perry & Hodges, 1999). Divided attention involves shifting focus from one stimulus to another, and possible neural substrates include the dorsalateral prefrontal cortex and anterior cingulate gyrus (Perry & Hodges, 1999). Sustained attention is defined as the ability to concentrate for an extended period of time, and is presumably controlled by the right frontoparietal system (Perry & Hodges, 1999). In early AD, individuals' performances during tasks suggests difficulties maintaining attention (Perry & Hodges, 1999). However, researchers have reported that sustained attention remains relatively preserved in the early stages of AD and individuals with moderate AD can maintain and selectively attend to visual and auditory stimuli (Hopper et al., 2001). Thus, although on certain tasks breakdowns in executive functions have been observed already in the early stages (Bayles & Tomoeda, 1995; Perry & Hodges, 1999), it appears that on other tasks persons with middle stage AD are still capable of regulating behavior, a facet of executive functioning.

Evidence for preservation of specific cognitive systems forms the theoretical basis for behavioral interventions implemented by speech-language pathologists. That is, to facilitate communication with persons with AD clinicians should capitalize on relatively spared cognitive abilities, such as the ability to sustain attention for short periods of time, read aloud and recognize pictures (Bayles & Tomoeda, 1995; Murray, Ramage & Hopper, 2001).

Communication and Alzheimer Disease

As a result of prominent memory and other cognitive deficits, communication is impaired from the earliest stages of the disease. Importantly, certain aspects of communication tend to be more affected than others. In seminal research in the field of language and AD, Bayles and colleagues (1989) described significant impairments in pragmatic and semantic aspects of language with a relative sparing of syntax and grammar. By using a discourse elicitation task (i.e., picture description) they noted that a significant proportion of their study participants with AD produced fewer information units than age-matched control participants. Other researchers have reported similar findings on related tasks (see Blanken, Dittmann, Haas & Wallesch, 1987; Bucks, Singh, Cuerden & Wilcock, 2000; Nicholas, Obler, Albert & Helm-Estabrooks, 1985) as well as difficulties expressing communicative intentions and drawing inferences (Chapman, Highley & Thompson, 1998).

Bayles, Tomoeda and Trosset (1992) went on to describe the communication deficits of individuals with AD by stage of cognitive decline. They conducted a descriptive study in which they evaluated the linguistic communication abilities of 152 persons with AD and 60 normal elders using a battery of linguistic communication tasks. The core linguistic battery entailed 11 tasks all using the same 13 stimulus items and included: confrontation naming, auditory and reading comprehension, writing to dictation, oral reading, concept definition, coordinate and superordinate naming, superordinate identification, and pantomime expression and recognition. Additional measures of language and cognition were derived from six other tasks, which included: sentence formulation, generative naming, and generative drawing, picture description,

object description, and administration of the Mini-Mental Sate Examination (MMSE; Folstein, Folstein & McHugh, 1975). The MMSE is a screening instrument containing items related to orientation, episodic memory, cognitive flexibility, language, and visuospatial skills. The total possible score on the MMSE is 30. A cut-off score of 23 is commonly used for detecting delirium or dementia in hospitalized patients (Crum, Anthony, Bassett & Folstein, 1993) Based on the results, Bayles and colleagues described the relationship between linguistic communication abilities of persons with AD and stage of the disease process. Ratings of dementia severity were derived using the Global Deterioration Scale (GDS; Reisberg, Ferris, de Leon, & Crook, 1982), a system that categorizes dementia to seven clinical stages (see Table 1). The greatest diversity in performance on tests was observed in participants in GDS stage 5, also known as the period of moderate dementia. In addition, the results suggested that the maximal decline in communicative functioning took place between GDS stage 4 and stage 6, periods of moderate to severe cognitive decline. Moreover, individuals with mild to moderate AD exhibited more variability in linguistic communication abilities than did persons with more severe stage AD.

Based on these findings, researchers have hypothesized that intentional, conscious linguistic processing is differentially impaired relative to automatic or less consciously effortful processing (Bayles & Tomoeda, 1997). Kempler and colleagues (1998) tested this hypothesis in a series of sentence comprehension experiments. Specifically, they explored whether difficulties with sentence comprehension in persons with AD could be attributed to deficits in syntactic processing or declining memory abilities. They compared the performance of persons with AD and healthy age matched controls on on-

line (cross-modal naming) tasks and off-line (picture-pointing and grammaticality judgement) tasks. The on-line tests aimed to minimize memory demands while still measuring the ability of persons with AD to process sentences. The off-line tasks required involvement of working memory and used the same sentences from the on-line condition to assess sentence comprehension. The results showed that persons with AD achieved a similar level of performance as healthy controls in the on-line condition but were impaired on the off-line condition. Better performance during the on-line tasks was attributed to the reduced cognitive processing demands, specifically on verbal working memory, imposed by the tasks compared to that of the off-line tasks. Disturbances in verbal working memory systems of the individuals with AD were argued to be responsible for the observed deficits in sentence comprehension in the off-line tasks (Kempler, Almor, Tyler, Andersen, & MacDonald, 1998; Kempler, Almor & MacDonald, 1998).

In summary, cognitive deficits underlie communication problems in AD. Whereas syntax and grammar tend to be relatively unaffected, sentence comprehension, word-finding and discourse tend to be impaired. In the following section, discourse will be discussed more fully as it pertains to the current proposed study.

Discourse and Alzheimer Disease

Discourse is a term used to define the organization of language beyond or across the level of the sentence and has been described as the fundamental component of social communication (Arkin & Mahendra, 2001). Effective discourse requires the continual interaction of cognitive systems such as attention, memory, perception and language (Arkin & Mahendra, 2001). Arkin and Mahendra (2001) describe several different types

of discourse discussed in the literature. Narrative discourse refers to language concerning an event or series of events. Procedural discourse involves language describing how to complete a task. Expository discourse is characterized as relatively less structured and occurs when an individual simply talks about a particular subject. Descriptive discourse refers to sequences of language produced detailing the features and qualities of a stimulus item. Finally, conversational discourse refers to language created through exchanging information, ideas and feelings with others.

Discourse tasks are used frequently in research with individuals with AD. This is because the tasks are a practical method for quantifying and qualifying the linguistic communication abilities of persons with AD and discourse samples can be readily obtained at all stages of the disease (Tomoeda et al, 1996). Currently, research that includes a focus on language and communication changes in persons with AD is primarily based on picture description and conversation tasks.

Tomoeda and Bayles (1993) documented the discourse of three persons diagnosed with probable AD and three matched healthy older adult controls for five consecutive years. The participants with AD were at different stages of the disease when the study commenced. In addition to an annual picture description task, the participants also completed an oral reading, confrontation naming and writing to dictation task. Results suggested the discourse measures most sensitive to the progressive linguistic and communicative decline of persons with AD were the number of total words and information units produced as well as indices of conciseness. Bayles and Tomoeda (1993) also assert that consistency of results between the three persons with AD suggest

that total words, information units, and conciseness are variables that accurately reflect disease effects and are unaffected by differences in style and personality.

Tomoeda, Bayles, Trosset, Azuna, and McGeagh (1996) conducted a cross-sectional analysis of the effects of dementia severity on the quantity and quality of spoken descriptive discourse in individuals with AD. Sixty-three individuals with AD participated in the study, 32 in Global Deterioration Scale (GDS) stage 4 and 31 in stage 5, as well as 52 healthy older adults and 5 individuals with mild cognitive impairment, GDS stage 3. The Norman Rockwell pictures "Easter Morning" and "The Runaway" were used as stimulus items because they are vivid depictions of a commonly shared experience. Participants had 3 minutes to describe what was happening in the stimulus picture. Examiners were only permitted to use non-specific prompts such as "Is there anything else you can say about the picture?" or "Tell me what else is happening" if a participant stopped talking before 3 minutes had elapsed. The eight selected measures from which Tomoeda and colleagues obtained both quantitative and qualitative data included total number of words, information units, circumlocutions, frustrations, aborted phrases, revisions, and ideational repetitions as well as conciseness, derived from dividing the total number of information units by the total number of words. Results showed that number of information units and conciseness were the best measures for determining the impact of AD on the descriptive discourse abilities for individuals in the mild to moderate stage of the disease. Discourse of individuals in GDS stage 3 and stage 4 contained the same number of words as the healthy older adults but was less concise and informative. Significant declines in the total number of words and information units

as well as conciseness were observed in persons in GDS stage 5 in addition to more frequent aborted phrases and revisions.

In a more recent study, Bucks, Singh, Cuerden and Wilcock (2000) analyzed the conversational discourse of 8 individuals with AD and 16 healthy older adults. Using a semi-structured interview approach, all participants were individually asked open-ended questions that encouraged them to talk about themselves and their lives. The length of time it took to generate at least 1000 spoken words from a participant dictated the duration of each interview. Eight linguistic measures were used to objectively describe the conversational discourse produced by participants including rate of use of pronouns, nouns, adjectives and verbs. Three measures of lexical richness also were computed: type token ratio, Brunet's index and Honore's Statistic. Lastly, a measure of semantic cohesion rate (in phrases referred to as "clause like semantic units") was determined and reflected the ability to create noun and verb phrases in addition to quantifying the flow of speech (Singh, 1996). Results were calculated for each participant and between group comparisons were made using the Mann-Whitney U test. Statistically significant differences ($p < .05$ and $p < .01$) were found between persons with AD and healthy older adults on all measures except semantic cohesion rate. Individuals with AD used comparatively more pronouns, adjectives and verbs and relatively fewer nouns with less lexically diverse conversational speech. Of importance to note is that individuals with AD and healthy older adults did not significantly differ on their ability to form noun and verb phrases. Thus, some aspects of discourse remain intact in AD and may be facilitated with proper strategy use in the form of cues and prompts from communication partners.

Arkin and Mahendra (2001) described a systematic method for analyzing the discourse of individuals with AD. They used the method to examine the prompted discourse of 11 participants with mild to moderate AD (7 experimental and 4 control) before and after different versions of a 20 week multi-modality intervention programme. The researchers elicited narrative, procedural, expository, conversational and descriptive discourse from each participant. Discourse-based outcome measures were ratio of on-topic comments to total utterances, ratio of different nouns to total nouns, and ratio of vague nouns to total nouns. Additional outcome measures were the number of information units produced on a picture description task, scores on the Mini-Mental Sate Examination (MMSE; Folstein, Folstein & McHugh, 1975) and a standardized language assessment. Both the experimental and control group participated in twice-weekly physical fitness training and a weekly supervised volunteer work session. As well, the experimental group received structured language interventions conducted by students during the fitness workout. These interventions included free and unprompted descriptions of Norman Rockwell pictures, word association and proverb activities, fluency exercises and advice and opinion questions. Control participants engaged in unstructured conversation with the students during the workout. Results showed that the proportion of on-topic comments was maintained by both groups from pre- to post-testing. A significant between-group difference in which participants in the experimental group performed better than persons in the control group as measured by the ratio of different nouns to total nouns was observed. Individuals in the control group declined significantly in the number of information units produced on the picture description task. The authors ultimately contended that the analysis of discourse is an ecologically valid

method of assessing change in persons with AD. Based on Arkin and Mahendra's results, this discourse analysis method was selected for use in the current study and will be discussed in more detail in the methods section.

Communication Strategies and Effects on Discourse in Alzheimer Disease

Effective communication is a critical component to caring for an individual with AD. Given that caregiver burden is associated with deficient communication with persons with AD and that communication breakdowns negatively affect quality of relationships between caregivers and care recipients with AD (Small, Gutman, Makela & Hillhouse, 2003), research is needed into the effects of specific caregiver linguistic modifications on the communication behavior of persons with AD. Certain strategies may be useful in improving the ability of individuals with AD to engage in meaningful conversation. Caregiver communication strategies are a form of intervention based on the presupposition that individuals with AD cannot purposefully modify their own behavior to facilitate communication, whereas caregivers can adjust their own behavior to do so (Hopper, 2001). Modifying linguistic input to reduce complexity may reduce demands on impaired working and episodic memory systems and increase the likelihood of successful communication between persons with AD and their caregivers.

Tomoeda, Bayles and Boone (1990) conducted a study exploring the effects of speech rate and syntactic complexity on the auditory comprehension of persons with AD. Auditory comprehension relies greatly on working memory because one has to hold in mind what others say and then formulate an appropriate response. Thirteen persons with AD and 17 healthy older adults were presented with an audiotaped voice giving consecutive commands dictating the appropriate arrangement of differently colored and

shaped wooden tokens. Three presentation rates of the prerecorded voice were used: a slow rate of 120 words per minute (wpm), a normal rate of 160 wpm, and a fast rate of 200 wpm. Results showed that rate of presentation did not significantly affect comprehension ability in either group. A significant main effect for level of syntactic complexity ($p = .012$) was found. Researchers also noted that persons with AD responded less well to commands that were eight words in length or longer and responded best to sentences that were four to six words long. Thus, the clinical implication of this study is that communication partners of persons with AD can facilitate comprehension by using shorter sentences that are syntactically less complex.

Another communication technique that caregivers can use is to ask questions that rely on recognition of a response (choice) or require only a yes/no response instead of free recall of a response (open-ended). This strategy may facilitate comprehension and improve the quality of communication interactions with persons with AD as open-ended questions have been reported to be difficult for people with moderate to severe AD (Bayles & Tomoeda, 1994). Formulating a response to an open-ended question requires an effortful search of memory whereas responding to yes/no question or choice questions does not involve generation of new information. Ripich, Ziol, Fritsh, and Durand (1999) investigated the effects of using open-ended versus choice and yes/no questions on the accuracy of responses produced by individuals with AD in conversation. Thirty-two individuals with early to midstage AD and their caregivers participated in the study. Within the context of a caregiver communication training program, data were collected at 1, 6 and 12 month intervals using an interview task called 'Plan a menu together for tonight's dinner." Mean percentage of successful communication exchanges was the

outcome and researchers found that yes/no and choice questions resulted in more successful outcomes at every time point compared to open-ended questions. Also, a trend for caregivers to decrease their use of open-ended questions was observed suggesting that caregivers were learning to use question types that led to more successful communicative exchanges. Ripich and colleagues ultimately concluded that improved communication means more connection between individuals who have AD and their caregivers. One of the difficulties in interpreting these data is that what constituted a successful versus failed exchange was never fully defined.

Small, Gutman, Makela, and Hillhouse (2003) examined the effectiveness of communication strategies used by family caregivers of 18 individuals with mild to moderate stage AD during activities of daily living. Using a naturalistic approach, participants were observed and audiotaped interacting in their own homes carrying out various activities of daily living including conversation. The number of communicative breakdowns was determined based on subjective ratings made by the caregiver, the individual with AD and the researcher and more objectively by calculating the number of breakdowns identified through analysis of the transcripts at a later time. Results showed that reduced distractions, and the use of simple sentences and yes/no questions were associated with fewer communicative breakdowns. The use of open-ended questions was not a communication strategy reportedly used by family caregivers of persons with AD. Tappen, Williams-Burgess, Edelstein, Touhy, and Fishman (1997) analyzed 35 transcribed conversations between advanced practice nurses and 23 individuals in the middle and later stages of AD. An interview format was used and nurses were instructed to avoid correcting the individual, to encourage meaningful conversation, and to attribute

meaning to all communicative attempts made by the individual. Questions asked by the nurse were classified as open-ended, closed-ended (i.e., questions requiring yes/no and one word answers) or mixed, in which case a closed-ended question was asked directly following an open-ended question without an opportunity for the persons with AD to respond. Responses made by the person with AD were coded as relevant or nonrelevant based on context of preceding statements. No significant differences in terms of length or relevance of responses to different question types were found. Interestingly, although nurse interviewers asked a greater proportion of closed-ended questions, the researchers report that the individuals with AD made some relatively long, meaningful responses to open-ended questions. This led Tappen and colleagues (1997) to suggest open-ended questions may in fact be a communication strategy well suited for facilitating discourse concerning feelings and emotions. The data indicate little reason to avoid the use of open-ended questions when conversing with individuals who have AD. In fact, avoiding open-ended questions is contraindicated by Tappen and colleagues' findings.

Further analysis on question type used by caregivers of individuals with AD also revealed interesting findings in support of open-ended questions. Small and Perry (2005) used a naturalistic approach to determine the types of questions caregivers use when conversing with their spouses with AD and the associated communicative outcomes. Eighteen caregiver-spouse dyads were audiotaped while conversing on a topic of their choice in their home environments. The spouse participants with dementia were screened using the Mini-Mental State Examination (Folstein, Folstein, & McHugh, 1975) to help stage severity. Severity of cognitive decline ranged from mild to low-moderate (M = 20.3, SD = 4.8, range = 12-27). The researchers hypothesized that caregiver questions

that required the individual with AD to invoke semantic memory in formulation of a response would result in more successful responses compared to those questions in which information in episodic memory needed to be recalled. Semantic questions were defined as questions that required the person with AD to "generate factual information, including general knowledge, ongoing events, and states of being" (p.129). Examples of caregiver semantic questions include *What would you like for dinner?* And *What do you call this thing?* Episodic questions, on the other hand, required the individual with AD to retrieve autobiographical information related to a particular time and place. Examples of these types of questions include *Where did we live after I changed jobs?* and *What did we eat for dinner yesterday?* Caregiver questions were coded according to type (i.e., yes-no, choice, or open-ended), the type of memory necessary to respond (i.e., semantic or episodic), and success of the response (i.e., was there a communication breakdown or not).

With regard to both episodic and semantic memory, open-ended questions resulted in a significantly greater frequency of communicative breakdown compared to yes-no questions (61% vs. 30%, respectively), $X^2(1, N = 172) = 17.17, p < .001$. (Only one choice question was recorded and therefore choice questions were not included in the analyses). Episodic memory questions resulted in significantly more communication breakdowns compared to semantic memory questions (56% vs. 24%, respectively), $X^2(1, N = 172) = 16.75, p < .000$. Analysis of the episodic memory questions used by caregivers and the success of the responses generated suggested that spouses with AD were more successful at responding to questions concerning events that happened more than three months ago compared to those about events that happened within the last three

months. No significant interaction was observed between question type and memory type with respect to occurrence of communication breakdowns ($p > .20$). Furthermore, although more breakdowns were observed with episodic than semantic questions, the size of this difference was mediated by the severity of the dementia. Caregivers of individuals with mild-stage AD experienced greater difference between the success of episodic versus semantic questions compared to caregivers of individuals with moderate stage AD (46% vs. 14%, respectively), $X^2(1, N = 172) = 4.69$, $p < .05$.

Based on the pattern of results, Small and Perry (2005) suggest that caregivers of individuals with mild to moderate stage AD can reduce communication breakdowns by not using episodic questions in conversation. Open-ended questions are recommended for use by caregivers if the response requires the speaker to rely only on semantic memory and does not require recall of information that is time-based from the past (episodic memory). Clearly, more research is needed to test the hypothesis that the use of open-ended semantic memory questions minimizes demands on the impaired cognitive and linguistic systems of persons with AD and results in improved communication.

Purpose of the Study

The purpose of the current study was to examine one aspect of caregiver communication hypothesized to reduce demands on impaired cognitive abilities of the person with AD and provide support for functional communication. The specific research question was: What are the effects of asking open-ended semantic memory questions versus open-ended episodic memory questions on the language of individuals with mild to moderate dementia of the Alzheimer type during a structured conversation task? This study builds on the previous work of researchers in the area, specifically that of Small

and Perry (2005), by offering an experimental investigation as opposed to a naturalistic approach to measuring the effects of different question types on the discourse of persons with AD. This study will be one in a line of research studies related to determining variables for inclusion in larger treatment efficacy studies. For this reason, all variables were operationally defined, a procedural protocol was devised and employed and data were systematically analyzed using formalized measures.

Method

Participants

Four individuals with a diagnosis of probable AD as determined by a medical doctor (i.e., primary care physician, neurologist, geriatrician) were selected for inclusion in the study. Participants were recruited through the Alzheimer Society of Alberta and Northwest Territories. The proposed study received ethics approval from the Health Research Ethics Board – Panel B.

Initially, nine individuals had consented to participate in the study. (In the event that the person with AD was unable to sign the consent form, a family member gave his signed consent.) However, three persons were excluded from participating in the study because they scored above 23 on the Mini-Mental State Examination (i.e., within normal limits). Additionally, one person was excluded because she did not have a diagnosis of probable AD. As well, although her Mini-Mental State Examination score was 23, based on her age and level of education it was considered to be in the normal range according to population based normative data published by Crum, Anthony, Basset and Folstein (1993). Scores that fall within 2 standard deviations of the reported mean are considered

normal. The participants that were included in this study achieved MMSE scores that were between 6 and 12 standard deviations below the reported means for their respective age and education levels. Another individual was excluded because she presented with a history of vascular disease as well as untreated depression. Participants with severe AD were excluded as it has been suggested that they are less likely to be able to participate in structured conversational activities (Bayles, Tomoeda & Trosset, 1992).

The four individuals who participated were females and ranged in age from 65 to 81 years old (see Table 2 for participant demographics). Each was married, living at home with her husband and spoke English as a first language. The presence of dementia was confirmed in interview by self-report from the participant and the participant's spouse. Severity of cognitive impairment was established through administration of the MMSE (Folstein et al., 1975), which is commonly used for this purpose. According to Tomoeda (2001) scores of 18 to 23 are commonly achieved by individuals with mild cognitive impairment, scores of 11 to 17 by moderately impaired individuals and scores of 0 to 10 by individuals with severe cognitive impairment. Participants' MMSE scores ranged between 12– 23/30 and based on Tomoeda (2001) two were characterized as mildly impaired and two as moderately cognitively impaired. The number of years of education completed by participants ranged from 11 to 14 years.

Table 2. Participant demographic characteristics.

Initials	Sex	Age	MMSE	Cognitive Impairment[a]	Education (in years)	Residence	Attends Social Outings	Medications (per day)
MM	F	65	23	mild	14	With spouse	Twice weekly	Ebixa 10 mg Reminyl 12mg Clonazepan .5mg Citalopram 40mg Risperdal .5mg
RH	F	69	19	mild	11	With spouse	Twice monthly	Exelon 3 mg Effexor 75mg
EC	F	81	16	moderate	14	With spouse	Daily	Exelon 6 mg
AH	F	68	12	moderate	11	With spouse	Twice weekly	Exelon 6 mg Ebixa 50 mg

MMSE: Mini-Mental State Exam

[a]Based on Tomoeda (2001) categories

All participants passed hearing and vision screenings. A speech discrimination test required each to correctly repeat back at least eight out of ten words from Boothroyd Isophonemic Word Lists (Boothroyd, 1971) on at least one of two trials. The words were spoken at between 65 and 70 dB SPL by the researcher. This loudness is appropriate as average, conversational speech is typically 60 dB SPL at 1 meter away (Bess & Humes, 2003). Vision was assessed using the Visual Perception and Literacy screening task, the Visual Field screening task, and the Visual Agnosia screening task from the *Arizona Battery for Communication Disorders of Dementia* (ABCD; Bayles & Tomoeda, 1993). All participants had adequate visual acuity to see size 36 Times New Roman font.

Experimental Design

A within-subjects experimental design was employed to assess the effects of question type on the discourse of individuals with AD. When the goal of research project is to determine the specific nature of a treatment and its effects, and to engage in hypothesis testing, studies with small numbers of participants are appropriate (Robey & Schulz,

1998). The participants were asked both types of questions (i.e., open-ended semantic memory questions and open-ended episodic memory questions) and responses were analyzed using discourse measures. This approach enabled the researcher to investigate group trends in the dependent variable (discourse) as well as individual responses of the participants. The inclusion of multiple participants also allowed the researcher to investigate replication of any observed treatment effects across individuals.

Procedures

General Outline of Procedures

After informed consent was obtained, participants were screened and interviewed. Following completion of the pre-study evaluation phase, the intervention phase involved one session conducted in approximately 10 minutes on average. During this time both treatments (i.e., open-ended semantic questions and open-ended episodic questions) were administered. See the following sections for details of each phase.

Pre-Study Evaluation Phase

The researcher conducted semi-structured interviews and a comprehensive, standardized cognitive-communication evaluation. The participant's spouse answered approximately eighteen questions regarding the participant's medical history, family, lifestyle, and personal achievements (see Appendix A for sample questionnaire). One question was especially critical as it related to the participant's most recent vacation, which was the topic used for the episodic memory questions. Spouses were instructed to answer the questions as though they were their partners and to the best of their abilities. At various times during the evaluation phase the researcher reviewed and discussed the responses provided with the participant and spouse.

The researcher administered the *Arizona Battery for Communication Disorders of Dementia* (ABCD; Bayles & Tomoeda, 1993) to all participants. The ABCD is a standardized test designed to evaluate mental status, verbal episodic memory, linguistic expression, linguistic comprehension, and visuospatial construction in individuals with mild and moderate dementia. Administration yields standard scores for these five constructs and a total overall score for the test. According to Tomoeda (2001), criterion validity has been established with three commonly used tests including the MMSE (Folstein, et al., 1975), the Global Deterioration Scale (Reisberg, et al., 1982), and the Block Design subtest of the Weschler Adult Intelligence Scale-Revised (Weschler, 1981). Essentially, the ABCD served to document participants' ability to comprehend and express language during structured tasks (see Table 3).

Table 3. Participant average construct summary and total overall scores from the ABCD.

Participant	Mental Status (out of 5)	Episodic Memory (out of 5)	Linguistic Expression (out of 5)	Linguistic Comprehension (out of 5)	Visuospatial Construction (out of 5)	Total Overall Score (out of 25)
MM	3.0	3.0	3.75	4.2	5.0	19.0
RH	2.0	3.2	2.5	2.4	Not completed[a]	10.1[b]
EC	2.0	2.6	2.5	2.4	4.5	14.0
AH	2.0	3.2	2.0	2.2	3.5	12.9

ABCD: Arizona Battery for Communication Disorders of Dementia
[a]Score unavailable because participant injured writing hand
[b]Score from Visuospatial Construction construct not included in Total

Although attention and executive functions are impaired in individuals with AD, these abilities were not tested explicitly in this study. Many of the tests designed to test

these cognitive processes are too difficult for individuals with more moderate levels of overall cognitive impairment. In addition, the researchers wanted to avoid excessive testing of participants, which may lead to fatigue and frustration.

Intervention Phase

The researcher began the treatment session in the same manner for each participant (see Appendix B for procedural protocol). At the beginning of the session, the researcher introduced herself and engaged the participant in a short conversation. The goal of this brief conversation was to remind the participant of the study in a general way and to re-establish rapport.

Following the greeting, the clinician introduced the first topic of conversation and made a general statement about it. The topic for each condition was the same for all participants in the study. For the episodic condition the topic was 'Vacation' and in the semantic condition the topic was 'Drinking and Driving'. To control for order and sequencing effects, the researcher counterbalanced the presentation of the treatment conditions for each participant (see Appendix C). While introducing the topic, a picture stimulus depicting the topic was simultaneously presented, with the title of the topic of conversation printed underneath the picture.

Next, the researcher used either a script of episodic memory questions or semantic memory questions. As the researcher asked each question she also presented the printed question on a cue card, putting it beside the topic picture for the participant to see. Three topic-related, open-ended questions were asked in each treatment condition. Participants were given 10 seconds maximum to respond. The researcher acknowledged all responses in a neutral manner, usually verbally by saying "Uhum" or non-verbally by head nodding

and smiling. In closing, the researcher asked a yes/no question meant to terminate the topic and allow the participant to make any final comments before transitioning to the next question condition. The second question condition was presented immediately (within 5 minutes) after completion of the first using the same procedures.

Episodic memory questions were operationally defined as questions that require the individual with AD to recall autobiographical information related to a particular salient event occurring in the last ten years. The following is the script used for the topic of "Vacation": (Note: The underlined components were different for each participant)

> Vacation.
>
> Everyone needs to take a break at some point and go away on vacation.
> 1. What was it like when you went to Spain in 2004?
> 2. How did you feel about going to Spain in 2004?
> 3. What did you do for fun while you were on vacation?
>
> Is there anything else you can tell me about when you went on vacation?

The first and second questions each disclosed two important facts about the participant's vacation, specifically where and when the vacation had taken place. Other topics considered for use in the episodic condition included 'Becoming a Grandparent' and 'Retiring'. The common theme shared amongst the topics is that each is a special event potentially having occurred in the last ten years of a participant's life. Following the semi-structured interview phase for the first participant, 'Vacation' was selected for use in the episodic condition because the first participant had become a grandparent for the first time and retired more than ten years ago. Thus, the topic of 'Vacation' was used for the remaining participants.

Semantic memory questions were operationally defined as questions that require the respondent to access conceptual knowledge about the world based on life experience. The semantic memory questions required participants to respond by sharing their perspectives, feelings and opinions on the topic of "Drinking and Driving" rather than about a past event. The following is the script used in the semantic condition:

> Drinking and Driving.
>
> Many people have strong opinions about drinking and driving.
>
> 1. What do you think about accidents caused by drinking and driving?
> 2. What should happen to people who choose to drink and drive?
> 3. What would you do if you knew someone was too drunk to drive?
>
> Is there anything else you can tell me about what you think about drinking and driving?

Questions selected for use in the semantic condition were based on work by Arkin (1995) and Arkin and Smith (2005). In a pilot program, Arkin (1995) had university student volunteers solicit opinions from individuals with mild to moderate AD on how to solve real-life problems. These "Advice and Opinion Scenarios" consisted of controversial adult issues such as assisted suicide and legalizing medicinal marijuana. Following reading the scenario aloud to the person with AD, the individual was asked what s/he thinks about the situation and/or how s/he would handle it. These types of questions have been used in research on wisdom of older adults without dementia (see Pasupathi, Baltes & Staudinger, 2001, for example). In studies of this type, typically aging older adults are presented with "wisdom-related dilemmas" (similar to the example above) and asked to solve these dilemmas using their world knowledge and life experience.

Stimuli

Picture stimuli were selected from images available on the Internet for free download. The researcher and thesis supervisor agreed on two images that appropriately represented the selected conversational topics. Each picture was prepared in a method consistent with that used by Hoerster and colleagues (2001). For the 'Vacation' topic a 5x7 color photograph of an older woman and man walking together along a beach was mounted onto a piece of 22 cm x 28 cm unlined white cardstock. The corresponding label 'Vacation', typed in bold size 36 Times New Roman font, black upper and lower case letters was mounted directly below the picture. For the 'Drinking and Driving' topic a 5x7 color photograph of a man drinking a bottle of beer while behind the wheel was used. Unlined white cardstock, 22 cm x 14 cm cue cards were also used to mount the questions which were typed in the same size font used for the picture.

Setting and Apparatus

Pre-treatment evaluation and intervention were conducted in the participant's place of residence. The clinician and the individual with AD sat beside one another at a dining room table in both phases of the study. Husbands who remained present during testing or for the intervention phase were asked ahead of time to avoid interjecting or offering cues or prompts to their wives.

A Sony digital video camcorder mounted on a miniature tripod sat inconspicuously on the table and recorded all interactions. A handheld Sony audio recorder coupled with a bi-directional external microphone was placed on the table between the researcher and the participant to ensure collection of high quality audio

recordings. Language produced by participants was transcribed using digital transcription equipment.

Discourse Analysis and Measurement Reliability

Using both the audio and video recordings, the discourse samples were transcribed verbatim by the researcher as Microsoft Word documents. To document the effects of asking open-ended episodic questions versus open-ended semantic questions on the language of individuals with AD during a structured conversation task, transcripts were analyzed using specific measures of language and discourse. A discourse coding scheme adapted from Holland et al. (1985) and largely based on work by Arkin and Mahendra (2001) was used to quantify the nature of the language produced by the individuals with AD in each condition. This particular discourse analysis method was selected as it had been successfully employed in previous research exploring language in persons with AD (see Baumback & Fragomeni, 2004; Arkin & Mahendra, 2001) and reported good inter-scorer reliability quotients.

Utterances

The operational definition of an "utterance" employed by Arkin and Mahendra (2001) was used for this study. Arkin and Mahendra (2001) refined Holland and colleagues' (1985) definition of a total and complete utterance as "whatever is included between normal pauses," (p.161) in an effort to reflect recognized grammatical conventions for pause indicators while assigning credit for all specific information offered by the persons with AD. Thus, every introductory dependent clause, independent clause, and non-restrictive dependent clause, as well as all infinitive and prepositional phrases that added specific information was included as utterances. All discourse

transcripts were demarcated into codeable utterances by the researcher, with a slash (/) indicating the boundary between two distinct utterances.

Codes

Following the demarcation of utterances, the researcher coded each participant's transcript using Arkin and Mahendra's (2001) scheme. Based on this, all utterances were categorized as positive, neutral or negative according to their content and the conversational context. Ratios of positive, neutral and negative utterances to total utterances were obtained in addition to frequency counts for each type of utterance observed. It is important to note that each utterance was considered as a response to the most recently asked prompt question, not the general topic of discussion. The impact of this decision will be reviewed in the discussion section under Future research.

Arkin and Mahendra (2001) developed an adaptation of the utterance coding system used by Holland and colleagues (1985) for individuals with aphasia where "positive utterances were classified as conversational facilitators and included queries, simple and elaborated response to queries, simple and elaborated topic comments, and conversational repairs and revisions," (p. 546). From that classification, Arkin and Mahendra (2001) created the following as positive codes in AD discourse analysis. Definitions and examples of codes are extracted directly from Arkin and Mahendra (2001):

(1) Topic Comment (**TC**): A complete content-filled, non-ambiguous statement relevant to the topic of discussion uttered following a prompt question. For example, when asked what she knew about AD, a woman with AD replied, "Well, I don't know very much./ I don't think anyone else knows much either./ They certainly don't seem to

have any sort of cures to handle it." These responses were coded as one neutral Don't Know response (see later), followed by two positive Topic Comments.

(2) Topic Comment Digression (**TCD**): A topic-related digression followed by one or more topic comments and an unprompted return to the topic under discussion. A rare example was elicited in response to a question about daily activities. "…Then I go for a walk around the grounds/**TC** and that takes about twenty minutes/**TC** and then I come in/**TC** I think I'm older than anybody that lives here besides myself/**TCD** (*She makes a logical digression followed by several content-filled statements related to it*) I feel like I'm antique/**TC**…This is a younger community/**TC** you now, I don't have anybody my own age/**TC** but I do go out on Thursdays/**TC** (*spontaneous return to topic*)."All utterances following Topic Comment Digression's were counted separately and not included in the outcome ratios calculated for each participant.

Based on work by Baumback and Fragomeni (2004), another positive utterance code called a "Topic Comment Question (**TCQ**)" was included. The Topic Comment Question was added to acknowledge participants who might ask the investigator a question about the topic of discussion.

Definitions and examples of neutral utterances are extracted directly from Arkin and Mahendra (2001) and included the following codes:

(1) Answer to a Question (**AQ**): Unelaborated yes or no answers to questions.

(2) Ambiguous Utterance (**AU**): Ambiguous utterance that adds no specific content or information. For example, when asked about John F. Kennedy and his family, a participant replied "He's a Bostonian / and I'm a Texan / and we didn't get along /, well, we got along all right / but I didn't have much to do with him /." In this example,

the first two utterances were scored as Topic Comments and the last three as Ambiguous Utterances.

(3) Don't Know (**DK**): "Don't know" or "don't remember" statements.

(4) Negative Self-Evaluation (**NSE**): A disparaging or apologetic remark about the participant's own memory or language ability. For example, "When I think of talking /, I can't think of anything /. When I think of talking /, I'm just rattling off/." The preceding statements would all be coded as Negative Self-Evaluations.

(5) Question by Subject (**QS**): Refers to questions initiated by the participant such as "Is today Thursday?" or "How much longer will this interview take?". This code would not include questions indicating failure to hear the prompt question, such as "What did you say?" or repetition of the researcher's question. These were coded as Social Lubricants (see next).

(6) Social Lubricant (**SL**): A pleasantry, platitude or socially appropriate utterance that moves the conversation along or signals the start or end of a speaking turn but provides no specific information. Sometimes interchangeable with Ambiguous Utterance. For example, at the conclusion of her first set of remarks about John F. Kennedy, a participant stated, "Other than that, I think that's about it"/.

(7) Topic Comment Digression/Initiated (**TCD/INIT**): Spontaneous initiation of a topic related to the prompt question that is followed by one or more topic comments (related to the initiated topic) and a prompted return to the main topic. For example, talking about planning a picnic a participant replied, "Well, I wouldn't have much to do/**TC** unless I drove my wife to the store/**TC** But Mary (*his daughter*) usually drives her/**TC** Yeah, her name is Mary, you know / **TCD/INIT** She works for Safeway"/**TC**.

All utterances following Topic Comment Digressions/Initiated were counted separately and not included in the outcome ratios.

Holland and colleagues (1985) initially classified negative utterances as "conversational 'tanglers' including incomplete thoughts, perseverations, echoic responses, evidence of miscomprehension, erroneous information, word finding difficulties, phonemic and semantic paraphasias, jargon, neologisms, and agrammatic utterances" (p.546). Based on this, Arkin and Mahendra (2001) developed the following negative codes. Definitions and examples are taken directly from Arkin and Mahendra (2001):

(1) Incomplete Thought (**ITH**): An incomplete thought, not followed by a complete thought during the same speaking turn. For example, in response to a question about John F. Kennedy and his family, a participant stated, "But they seemed, I thought, for young people that got themselves into a position"/**ITH**.

(2) Meaning Unclear (**MU**): A statement in which the meaning can not be inferred from the context of the ongoing conversation. For example, in response to a question about childhood memories suggested by the word "play" a participant said, "It makes me think of children /**TC** and I do have a family /**TC** but I don't think I can exaggerate /**MU** so I better call it in" /**MU**.

Off-the-Wall! (**OTW**): Implausible or really bizarre statement. May be interchanged with Meaning Unclear. For example, when asked about John F. Kennedy and his family, a participant replied, "I don't remember too much about him / He wasn't noisy." In this example, the first utterance was scored as a neutral Don't Know statement and the second as an Off-The-Wall! utterance.

(3) Off Topic Statement (**OT**): A statement unrelated to the topic under discussion and not followed by related topic comments. For example, in response to a question about childhood memories related to the word "play" a participant replied, "I don't remember how old I was /**OT** when I did all the nursing you know /**OT** and I went with several nurses /**MU** and when I was in the military"/**ITH**.

(4) Off Topic Statement/Initiated (**OT/INIT**): An off topic statement that is followed by one or more topic comments related to the initiated off topic statement, and is not followed by a return to the original topic. For example, when asked about adult memories associated with the word "play" a participant responded, "Well, I had a very good marriage /, we never quarrelled in the time we were married /." The initial utterance was an off-topic comment, with several related facts following this initial statement. The participant did not return to the initial topic of memories associated with the word "play" till prompted by the examiner. Topic Comments produced subsequent to an off topic initiated discussion were noted as evidence of ability to initiate and follow a self-initiated topic, but were counted separately and not included in the outcome ratios.

(5) Topic Comment with Anomia (**TC/ANOM**): A factual statement that shows evidence of word finding difficulty. For example, in response to the question "What are some ways a family could handle the dilemma of a pregnant teenager?" a participant replied, "I suppose they could want her not to have the child / get a …have a …take a child …if a child has a disease …you can have it …tale it out before it's born /." In this case, the first utterance was coded as a Topic Comment, and the second utterance as a Topic Comment with Anomia.

(6) Topic comment Confabulatory (**TC/CON**): Statement that was either true of a past time but is no longer true, or that is an exaggeration or made up story. Examples: referring to making dinner for a deceased husband as if it were a current daily activity, or another participant referred to herself as a former FBI agent, a former nurse, and former neighbor of President Eisenhower.

(7) Topic Comment Erroneous (**TCE**): Factually incorrect topic-related statement. Not always detectable if there is little knowledge of participant's past.

(8) Topic Comment Repeated (**TCR**): A factual statement that was previously made in response to the current prompt question. Serves as an indicator of perseveration.

Inter-scorer Reliability

Utterances: Agreement for demarcation and coding of utterances was established over two trials. Initially, the researcher, thesis supervisor, and a graduate research assistant independently coded the episodic and semantic conditions in one participant's transcript (EC) in which the researcher had already demarcated the utterances. After coding independently, the three met to discuss the rationale for utterance classifications until consensus was achieved. Once all the rules for utterance demarcation and classification were decided, a first inter-scorer agreement check was conducted in which the thesis supervisor independently demarcated the utterances in three randomly selected conversations. The total number of utterances obtained by each scorer is indicated in Table 4a.

Table 4a. Total utterance counts obtained by scorer 1 and scorer 2.

Transcript	Scorer 1	Scorer 2
AH – Semantic Total utterances	26	26
MM – Episodic Total utterances	31	30
RH – Semantic Total utterances	71	70

Codes: All scorers independently coded the three randomly selected conversations with the utterances already demarcated. Table 4b illustrates the inter-scorer reliability quotients obtained. Reliability quotients were calculated by counting the number of point-to-point agreements divided by the total number of possible agreements between the primary investigator and the graduate research assistant.

Table 4b. Inter-scorer agreement for utterance coding.

Transcript	**No. of Agreements**	**No. of Possible Agreements**	**Inter-scorer Agreement**
AH – Semantic	23	26	0.88
MM – Episodic	28	31	0.90
RH – Semantic	53	71	0.75
Total utterances	104	128	0.84

The reliability quotient was relatively low for RH's transcript. This was primarily a function of differences in interpretation of humorous interjections that characterized RH's conversational style and one particular section in her conversation in which she

digressed from the topic question, but not the main topic. The majority of disagreements (20/24) were resolved using the third scorer's data, yielding a reliability quotient of 0.97.

Intra-scorer Reliability

To ascertain intra-scorer agreement, the primary investigator recoded the conversations that had not been selected for inter-scorer reliability six weeks following the time of original coding. This time period was selected based on time lines employed in other studies in the field (see Hopper et al., 1998, for example). Intra-scorer reliability was calculated by counting the number of point-to-point agreements divided by the total number of possible agreements. Table 4c contains the intra-scorer reliability quotients obtained by the researcher.

Table 4c. Intra-scorer agreement for utterance coding.

Transcript	No. of Agreements	No. of Possible Agreements	Intra-scorer Agreement
AH – Episodic	24	25	0.96
MM – Semantic	46	47	0.98
RH – Episodic	55	63	0.87
Total utterances	125	135	0.93

Data Analysis

Descriptive statistics were used to assess language produced in response to different question types (episodic versus semantic). The researcher made frequency counts of each type of utterance produced by participants. Then, a ratio of positive, neutral and negative utterances to total utterances was calculated for each transcript. All

utterances following topic digressions were counted separately and thus not included in the outcome ratios calculated for each participant. Visual inspection of the data for increases in on-topic utterances and decreases in irrelevant statements by treatment condition was a supplementary method of data analysis used to reflect individual participant's discourse behavior.

Results

Episodic versus Semantic Memory Questions: Individual Responses

Participant RH

Number of Utterances: The amount of discourse elicited from RH was similar in each condition; 51 utterances in the episodic condition versus 56 utterances in the semantic condition. Including digressions, the episodic and semantic questions evoked 64 and 71 utterances respectively.

Number of Positive, Neutral and Negative Utterances by Condition: Of the 51 utterances RH provided in response to the episodic questions, 34 were coded as positive, 11 as neutral and 6 as negative. Of the 56 utterances in response to the semantic questions, 35 were coded as positive, 15 as neutral and 6 as negative.

Ratios of Interest: The ratio of positive to total utterances in the episodic condition was 67% and 63% in the semantic condition. Neutral to total utterances in the episodic condition was 22% and 27% in the semantic condition. Finally, the ratio of negative to total utterances was 12% in the episodic condition and 11% in the semantic condition (see Figure 1).

Summary Statement: Essentially no differences in discourse were observed for participant RH as measured by the ratios of positive, neutral and negative to total utterances calculated across treatment conditions.

Participant EC

Number of Utterances: EC produced 32 utterances in the episodic condition and 30 utterances in the semantic condition. Including digressions, the episodic and semantic questions evoked 37 and 31 utterances respectively.

Number of Positive, Neutral and Negative Utterances by Condition: Of the 32 utterances EC provided in response to the episodic questions, 21 were coded as positive, 7 as neutral and 4 as negative utterances. Of the 30 utterances in response to the semantic questions, 24 were coded as positive and 6 as neutral. None were coded as negative utterances.

Ratios of Interest: Participant EC used a greater proportion of positive utterances in the semantic condition (80%) versus the episodic condition (66%). The ratio of neutral to total utterances in the episodic condition was 22% and 20% in the semantic condition. Finally, the ratio of negative to total utterances was 13% in the episodic condition. No negative utterances were produced in response to the semantic memory questions (see Figure 1).

Summary Statement: EC produced more positive, on-topic utterances and no negative utterances in the semantic condition as compared to the episodic condition.

Participant MM

Number of Utterances: MM produced 24 utterances in the episodic condition and 54 in the semantic condition. Including digressions, the episodic and semantic questions evoked 31 and 57 utterances respectively.

Number of Positive, Neutral and Negative Utterances by Condition:

Of the 24 utterances MM provided in response to the episodic questions, 17 were coded as positive and 7 as neutral utterances. No negative utterances were produced. Of the 54 utterances in response to the semantic questions, 50 were coded as positive and 4 as neutral utterances. Again, no negative utterances were produced.

Ratios of Interest: MM produced a significantly greater proportion of positive utterances in the semantic condition (93%) as compared to the episodic condition (71%). Twenty-nine percent of the utterances produced in the episodic condition were neutral versus 7% in the semantic condition.

Summary Statement: More on-topic utterances were observed to occur in the semantic condition as measured by the ratios of positive to total utterances calculated across treatment conditions.

Participant AH

Number of Utterances: The amount of discourse elicited from AH was similar in each condition; 27 utterances in the episodic condition and 26 utterances in the semantic condition. There were no instances of digressions in AH's conversational discourse.

Number of Positive, Neutral and Negative Utterances by Condition:

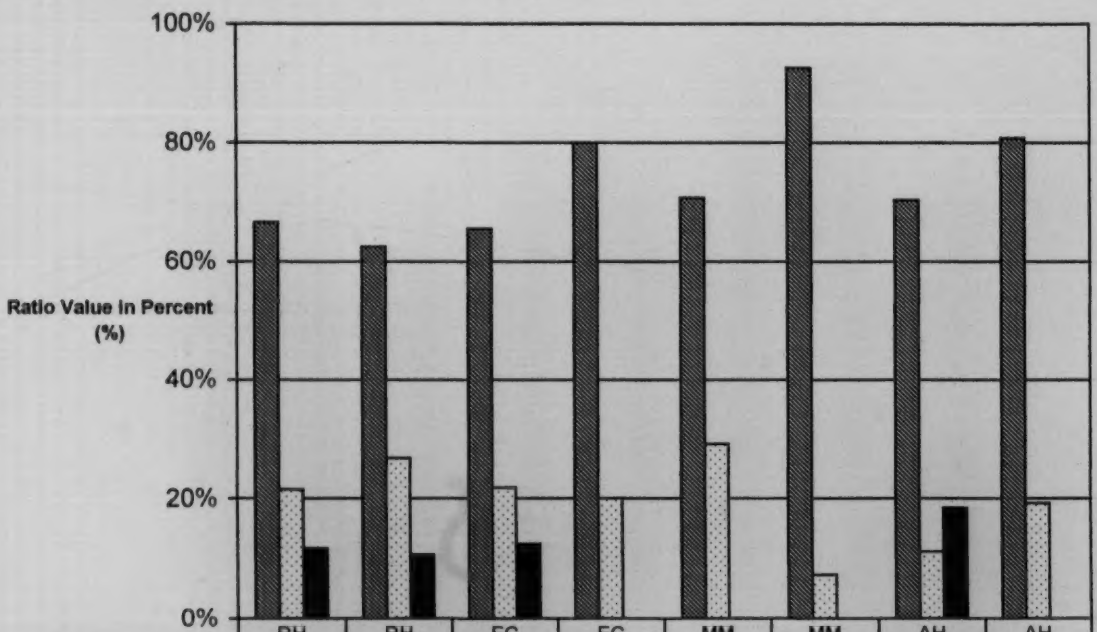
Of the 27 utterances AH provided in response to the episodic questions, 19 were coded as positive, 3 as neutral and 5 as negative utterances. Of the 26 utterances in

response to the semantic questions, 21 were coded as positive and 5 as neutral utterances. None was coded as a negative utterance.

Ratios of Interest: AH produced a greater proportion of positive utterances in the semantic condition (81%) as compared to the episodic condition (70%). A greater proportion of the utterances were classified as negative in the episodic condition (19%). No negatives utterances were produced in response to semantic memory questions.

Summary Statement: AH produced more positive, on-topic utterances and no negative utterances in the semantic condition as compared to the episodic condition.

Figure 1. Individual ratios for positive, neutral, and negative utterances to total utterances according to condition.



	RH Episodic	RH Semantic	EC Episodic	EC Semantic	MM Episodic	MM Semantic	AH Episodic	AH Semantic
Positive utterances	67%	63%	66%	80%	71%	93%	70%	81%
Neutral utterances	22%	27%	22%	20%	29%	7%	11%	19%
Negative utterances	12%	11%	13%	0%	0%	0%	19%	0%

Episodic versus Semantic Memory Questions: Group Results

Number of Utterances: In total, 348 utterances were coded and analyzed. Across all four participants, 12 utterances contained instances of unintelligible speech and therefore were not included in any of the outcome ratios. Including digressions, the episodic and semantic conditions totaled 159 and 185 utterances respectively. Excluding the utterances following digressions, episodic memory questions yielded 134 utterances (range = 24-51 utterances per participant) and semantic memory questions elicited 166 utterances (range = 26-56 utterances per participant). These were the values used for calculating outcome ratios.

Number of Positive, Neutral and Negative Utterances by Condition:

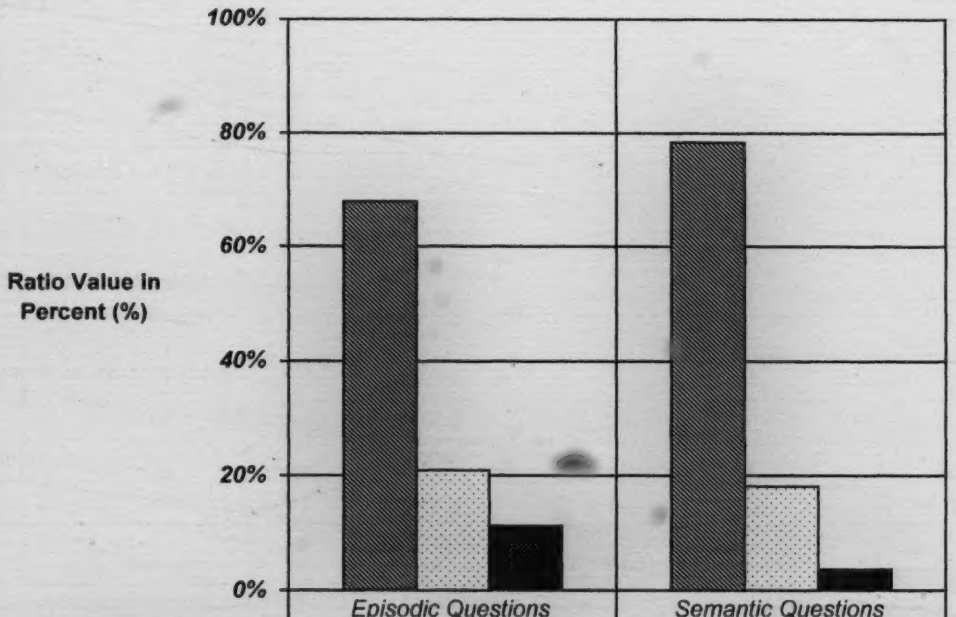
Of the 134 utterances provided in response to the episodic questions, 91 were coded as positive, 28 as neutral and 15 as negative utterances. Of the 166 utterances in response to the semantic questions, 130 were coded as positive, 30 as neutral and 6 as negative utterances.

Ratios of Interest: The mean group ratios of positive, neutral, and negative utterances to total utterances were compared across the two question conditions (see Figure 2). The average ratio for positive to total utterances was 10% greater in the semantic condition (78% versus 68% in the episodic condition). The average ratio for negative to total utterances was 7% greater in the episodic condition (11% versus 4% in the semantic condition).

Within the episodic condition, the range of proportions of positive utterances was relatively narrow with difference of 5% between the highest and lowest values. Within

the semantic condition, the range of proportions of positive utterances was more widely distributed with a difference of 30% between the highest and lowest values.

Figure 2. Mean group ratios for positive, neutral and negative utterances to total utterances according to question type.



	Episodic Questions	Semantic Questions
Positive utterances	68%	78%
Neutral utterances	21%	18%
Negative utterances	11%	4%

Table 5 provides group frequency counts of specific types of utterances observed in each condition. Utterances characterized as "Negative Self-Evaluation" and "Don't know" and "don't remember" statements were observed only in the episodic condition. All four participants produced discourse that contained at least one of "Negative Self-Evaluation" and "Don't know" and "don't remember" statements. One participant

produced both. Moreover, four instances of the negative utterance "Topic Comment Repeated" were noted in the episodic condition. None of these particular types of utterances was observed in the semantic condition.

Table 5. Overall frequency of specific positive, neutral and negative utterances observed according to question type.

	Episodic Memory Questions	**Semantic Memory Questions**
Positive Utterances	Topic Comment: 90 Topic Comment Question: 1 Topic Comment Digression: 0	Topic Comment: 130 Topic Comment Question: 0 Topic Comment Digression: 0
Neutral Utterances	Social Lubricant: 13 Ambiguous Utterance: 2 Topic Comment Digression/ Initiated: 7 Don't Know: 3 Negative Self-Evaluation: 3 Question by Subject: 0 Answer to a Question: 0	Social Lubricant: 21 Ambiguous Utterance: 3 Topic Comment Digression/ Initiated: 5 Don't Know: 0 Negative Self-Evaluation: 0 Question by Subject: 1 Answer to a Question: 0
Negative Utterances	Meaning Unclear: 8 Topic Comment/Anomia: 2 Topic Comment Repeated: 4 Off Topic Statement/ Initiated: 0 Topic Comment Erroneous: 1 Topic Comment/ Confabulatory: 0 Off-the-Wall: 0 Off Topic Statement: 0 Off Topic Question/ Initiated: 0	Meaning Unclear: 4 Topic Comment/Anomia: 1 Topic Comment Repeated: 0 Off Topic Statement/ Initiated: 1 Topic Comment Erroneous: 0 Topic Comment/ Confabulatory: 0 Off-the-Wall: 0 Off Topic Statement: 0 Off Topic Question/ Initiated: 0

As Table 5 shows, certain types of utterances were not made by any of the participants in either condition. In particular the positive utterance code "Topic Comment

Digression," the neutral utterance code "Answer to a Question," and negative utterance codes "Topic Comment Confabulatory," "off-the-wall," "Off Topic Statement" and "Off Topic Question/Initiated" were never observed.

Summary Statements: More on-topic utterances were observed to occur in the semantic condition as measured by the mean group ratios of positive to total utterances calculated across treatment conditions. A greater proportion of negative utterances was produced in response to the episodic questions. Furthermore, "Negative Self-Evaluations," "Don't know" and "don't remember" statements, and "Topic Comment Repetitions" were only observed in the episodic condition.

Discussion

The researcher examined the effects of asking open-ended semantic memory questions versus open-ended episodic memory questions on the language of individuals with AD during a structured conversation task. Based on the previous literature and using the language coding scheme and measures devised by Arkin and Mahendra (2001) it was hypothesized that individuals with AD would use more on-topic utterances and fewer negative utterances in responding to questions designed to draw on semantic memory.

Effect of Semantic and Episodic Memory Questions on Discourse of Persons with AD

The researcher hypothesized that individuals with AD would use more on-topic utterances and fewer irrelevant and off topic utterances in responding to semantic memory questions compared to episodic ones. The pattern of a greater proportion of positive utterances in the semantic condition was apparent in the discourse of three of the four participants. Group mean data also confirmed the hypothesis that persons with AD

would produce more on-topic (positive) utterances and fewer irrelevant and off topic utterances (negative) in responding to semantic memory questions versus episodic in structured conversation. Yet, one participant demonstrated the reverse pattern of performance.

RH had a higher ratio of positive to total utterances in the episodic memory condition. One reason for this result may be that the topic episode for RH (her vacation) occurred relatively recently (one month prior to the study), whereas the vacations that were the topics of the episodic memory conditions for the other three participants occurred from 3 months to 2 years prior to the study. In general, the more recent the event in one's life, the more easily it is remembered (Baddeley, 1999). Therefore, it is possible that even in the case of an individual with dementia, a more recent vacation would be better recalled than a more remote one. Specifically, RH may have had better access to memories from her recent vacation than did the other participants, and the recency effect may have minimized any difference between the types of utterances she produced in each treatment condition.

However, upon closer inspection of the data, it appears that RH's ratio of positive/total utterances (67%) in the episodic condition is similar to those of the other three participants (66%, 71% and 70%). Her ratio of positive to total utterances in the semantic condition (63%) is markedly lower than the ratios of the other three participants (80%, 93%, 81%). In the case of RH, it appeared that the semantic memory questions actually evoked personal episodic memories related to the topic. Thus, RH tried to recall aspects of these events, rather than discussing generally her opinion and perspectives on drinking and driving.

The performance of MM also deserves discussion as she had the largest difference in the ratio of positive utterances/total utterances between treatment conditions. MM produced double the number of utterances when responding to questions in the semantic condition. Notably, MM was the participant in the earliest stages of the disease process with a Mini-Mental State Exam (MMSE) score of 23. Although wisdom may not be considered a characteristic of individuals with generalized intellectual impairments of AD, the use of conceptual knowledge about the world and the ability to express feelings and opinions appeared to be relatively preserved in the early stages of the disease process (Arkin & Mahendra, 2001; Tappen et al., 1997).

Another explanation for this pattern is that MM may have been greatly interested in the topic of 'Drinking and Driving'. Personal interest and knowledge about a topic influence the type and amount of language produced in response to questions about it and may have contributed to her discourse performance in this study.

Like MM, participants EC and AH used a greater proportion of positive utterances in the semantic condition as compared to the episodic condition. However, neither EC nor AH produced negative utterances in the semantic condition, but had ratios of 13% (EC) and 19% (AH) negative to total utterances in the episodic condition. Clearly, asking individuals in the moderate stages of AD open-ended questions that require them to "remember" events and discuss them meaningfully can lead to negative, off-topic responses. Also of interest is the fact that individuals with moderate AD may still be aware of their memory problems, as evidenced by "negative self-evaluation" comments about their own memory abilities. These findings are consistent with findings that some individuals with AD are aware of their episodic memory problems early in the

disease course (Arkin & Mahendra, 2001). Interestingly, the participant who did not make any "Negative Self-Evaluation" comments was the only participant on an antidepressant medication (RH).

In summary, findings from the current study are consistent with those of Small and Perry (2005) who reported that episodic memory questions resulted in significantly more communication breakdowns compared to semantic memory questions. These findings also are consistent with the hypothesis that the use of semantic memory questions minimizes demands on the impaired cognitive and linguistic systems of persons with AD and results in improved communication. However, the pilot nature of this study and the small difference and overlap in range of percentages between conditions mean that caution is warranted when interpreting the data.

Discourse Characteristics and the Use of Cues

Certain types of utterances did not occur in any of the discourse samples in either condition. "Topic Comment Digressions" that spontaneously returned to the topic of discussion were not observed. This is in keeping with Arkin and Mahendra (2001) who reported that this type of utterance rarely occurred in the language of individuals with AD. In our study, only prompted returns to the topic of discussion were noted to occur. This is likely a function of the visual supports used in this study to provide structure to the conversation. These included the cue cards with the questions typed out in large-point font and the 5x7 color photograph depicting the topic of the conversation and labeled with either 'Drinking and Driving' or 'Vacation'. All participants were observed to make use of the cue cards and picture during the conversation and made comments to indicate that they used the visual support to remind themselves of the conversational topic. These

utterances were coded as "Social Lubricants." The use of written cues and prompts to return to the topic of conversation is an important finding of the current study. The participants' use of these prompts is evidence that some individuals with AD may benefit from the use of written labels, signs, etc. to facilitate on-topic conversations. Indeed, these results are consistent with reports from other researchers (Bayles et al., 1992; Bourgeois, 1992; Hopper et al., 2001) that many individuals with AD are able to read aloud until later in the disease process.

Clinical Implications

Arkin and Mahendra (2005) asserted that introducing different topics of conversation will help give individuals with AD opportunities to express their emotions and opinions and Tappen and colleagues (1997) discussed the importance of providing individuals with AD the opportunity to talk about their feelings. The results of the current study lend support to the use of certain types of open-ended questions with individuals who have mild-moderate AD. Even in the episodic memory condition, the participants in this study produced some on-topic language in response to questions about a salient, positive past experiences. The nature of the questioning is always important to consider. Questions perceived to be "tests" of memory may not be well-received by the individual with AD who has some awareness of his or her memory deficit. However, with appropriate cues, including pictures and descriptive words and phrases, episodic memory questions may be appropriate. Bourgeois (in press) has reported on the successful use of memory books based on this principle. However, health professionals and caregivers should be prepared to redirect or counsel the individual with AD if necessary should an individual express a negative self-evaluation out of frustration during these types of

conversations. Asking for opinions on topics of interest to the person with AD may lead to more positive discussions and fewer instances of frustration and breakdown.

Limitations of the Current Study and Directions for Future Research

It was the intention of the researcher to design questions that required recall of specific types of information – either event-related information (episodic memory) or conceptual knowledge (semantic memory). However, it was evident following analysis of the discourse samples that responses to semantic memory questions reflected recall of autobiographical memories. Hence, the inherent difficulties of devising questions that exclusively stimulate episodic and semantic memory systems were revealed.

An outcome goal for this study was to be able to comment and inform on variables for consideration in larger treatment studies. Frequency counts of specific utterance codes was a useful measure in this study as they were indicative of the prevalence of defined utterance types. This is an attribute that Arkin and Mahendra (2001) asserted would be wise to include in studies that would be employing their coding scheme and reporting results. Participant variables such as dementia severity, type of dementia, and time since experiencing the event that is the topic of the episodic memory questions are important to consider.

These results should be replicated, especially with male individuals with AD. The effects of different question types on the discourse of individuals with severe AD during structured conversational activities also should be explored. Partners' responses to the interaction also should be investigated. Some researchers have employed social validation measures such as visual analogue scales and unfamiliar judges to rate specific conversation qualities (see Hoerster, Hickey & Bourgeois, 2001). This additional

dimension would lend strength to a study. Using individualized photos for episodic conditions as opposed to generic photos is another possibility to explore in future studies of this type.

Conclusion

The results of this study provide evidence that individuals with mild to moderate AD can contribute on-topic and meaningful information in structured conversations about their most recent vacation (episodic topic) as well as their thoughts on issues related to drinking and driving (semantic topic). On average, the semantic questions led to 10% more on-topic utterances. Only the episodic questions resulted in discourse embedded with "Negative Self-Evaluations" and "Don't know" and "don't remember" statements as well as "Topic Comment Repetitions." However, open-ended questions requiring involvement of episodic memory may not need to be avoided by caregivers of individuals with AD, as these questions may not lead to a dramatically greater proportion of negative utterances and subsequent communication breakdowns. The results of this study also offer evidence in support of the use of multiple modalities to facilitate conversation with individuals with AD. Replications of this research are necessary to demonstrate the benefits of structured conversation therapies for individuals with AD.

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Appendix A. Interview Questions for Participants and/or Family Member

Pre-Evaluation Phase

1. What is your age?
2. When were you diagnosed with Alzheimer disease?
    a. By whom?
    b. Where?
3. What are your hobbies and interests? What do you like to do (For each hobby/interest – When did you start these pursuits?)
4. Tell me about your family. I'm interested in knowing names and where and how often you have contact with family members.

    When did you first become a grandparent?
5. Tell me about some of the places you've lived. Where were you born?
6. Tell me about your parents and your life as a child. What did you do for fun?
7. When did you first get married (if married)?

    When did you buy your first home?

    When did you buy your first car?

    What was your first job as an adult?
8. How old were you during the Second World War (1939-1945)?
9. How much education do you have?
10. Have you ever been treated for psychiatric disorders? Eg. nervous breakdown
11. Have you ever or are you currently being treated for depression?
12. How often do you go out with friends?
13. What was your most recent vacation?
14. What did you do for a living before retiring?
    a. When did you retire?
    b. What was your favorite job during your life?
15. Do you speak any languages other than English? Is English your first language?
16. Have you had any hearing problems? Do you have a hearing aid?
17. Is your vision normal with glasses?
18. Are you on any medications right now?

Appendix B. Procedural Protocol

Intervention Phase

After setting up video camera to record the following procedures were followed:

1. Researcher greets participant and introduces self
2. Researcher and participant sit in designated spots for study
3. Researcher checks visual and auditory aides, if necessary
4. Client and researcher talk briefly for 1-3 minutes during which time researcher reminds participant of the purpose of the visit. Researcher then tells participant she is there to talk with him/her about some interesting topics.
5. Researcher verbally states topic and presents picture
6. Researcher presents cue card with first question typed on it and reads the question aloud
7. Researcher waits 15 seconds for a response. If there is a response the researcher will acknowledge it verbally by saying "I see" or non-verbally by head nodding and smiling.
8. Researcher presents second cue card and question
9. Researcher waits 15 seconds for a response. If there is a response the researcher will acknowledge it verbally by saying "I see" or non-verbally by head nodding and smiling.
10. Researcher presents third cue card and question
11. Researcher waits 15 seconds for a response. If there is a response the researcher will acknowledge it verbally by saying "I see" or non-verbally by head nodding.
12. If it is the first conversation topic the researcher ends the conversation by thanking the individual for sharing on the topic while removing the picture. A 10 minute coffee break will precede the second conversation topic and question script.
13. Researcher will resume intervention at step 2 to administer second topic and intervention.
14. After the second conversation topic the researcher ends the conversation by thanking the individual for sharing his/her opinion on the topic while removing the picture.

Appendix C. Order of Presentation of Topics

Participant	Treatment Condition	
	1	2
MM	Episodic Questions	Semantic Questions
EC	Episodic Questions	Semantic Questions
RH	Semantic Questions	Episodic Questions
AH	Semantic Questions	Episodic Questions